

**REMARKS**

Claims 10-12 and 15-19 are pending after entry of this paper. Claims 1-15 have been rejected. Claims 1-9 and 13-14 have been cancelled with out prejudice. Applicants reserve the right to pursue the subject matter of the cancelled claims in a continuing application.

Claims 10-12 and 15 have been amended. Support may be found throughout the instant specification, for example, at page 5, lines 5-26 and original claim 14.

New claims 16-19 have been added. Support may be found throughout the instant specification, for example, at page 5, lines 5-26 and original claim 14.

No new matter has been introduced by these amendments. Reconsideration and withdrawal of the pending rejections in view of the above claim amendments and below remarks are respectfully requested.

**Response to Rejections under 35 U.S.C. §112**

Claims 1-15 stand rejected under 35 U.S.C. §112, first paragraph, for indefiniteness. Specifically, the Examiner contends that the claims are rendered vague for an alleged failure to recite clear and distinct process steps. Applicants have amended the claims to address the Examiner's concerns. Applicants respectfully request reconsideration and withdrawal of the indefiniteness rejection under 35 U.S.C. §112, first paragraph.

**Response to Rejections under 35 U.S.C. §102**

Claims 1-15 have been rejected under 35 U.S.C. §102(b) as allegedly being anticipated by JP 11-018793, henceforth "the JP '793 application." A machine translation of the JP Patent Application 11-018793 has been obtained, a copy of which is attached for the

Examiner's convenience. Specifically, the Examiner alleges that the JP '793 application discloses the same products and methods for producing  $\beta$ -1,4-mannobiose-containing compositions, where a mannan degrading enzyme is reacted with a natural material that contains mannan to produce effective amounts by weight of  $\beta$ -1,4-mannobiose as recited by the instant claims (Office Action, page 3). Applicants respectfully disagree. However, to expedite prosecution and without disclaimer of, or prejudice to, the subject matter recited therein, claims 1-9 and 11-13 have been cancelled rendering this rejection partially moot. Claims 10 and 11 have been amended and are drawn to a method of using a  $\beta$ -1,4-mannobiose-containing composition as a feed additive that can prevent the colonization of salmonella in livestock.

Applicants assert that the JP '793 application does not anticipate the instantly claimed invention, either explicitly or inherently. The JP '793 application discloses a method for producing and isolating crystalline mannobiose using enzymes of *Aspergillus niger* origin. There is no disclosure of any weight percent ranges or methods of inhibiting the colonization of salmonella in the JP '793 application.

In contrast, the instant claims are directed to methods of using  $\beta$ -1,4-mannobiose-containing compositions as a feed additive for feed that inhibits the colonization of salmonella in livestock and poultry, where: *i*)  $\beta$ -1,4-mannobiose is at least 3% by weight of the dry matter portion of the  $\beta$ -1,4-mannobiose composition (claim 10); *ii*)  $\beta$ -1,4-mannobiose is at least 10% by weight of the dry matter portion of the  $\beta$ -1,4-mannobiose composition derived from an *extract* of a mannan-containing natural material (claim 11); and *iii*) the amount of  $\beta$ -1,4-mannobiose is at least 0.001 -1% by weight of the dry matter portion of the feed (claim 15). Additionally, the instant claims are directed to methods of inhibiting the colonization of salmonella in livestock or poultry by feeding livestock or poultry feed comprising a  $\beta$ -1,4-mannobiose composition (claim

16 and 17), where the amount of  $\beta$ -1,4-mannobiose is at least 0.001 -1% by weight of the dry matter portion of the feed (claim 19).

Applicants assert that the JP '793 application does not disclose nor suggest the use of a  $\beta$ -1,4-mannobiose-containing composition as a feed additive at the claimed weight percent ranges. Furthermore, the JP '793 application does not disclose inhibition of salmonella colonization in livestock or poultry as instantly claimed. The present specification clearly sets forth unexpected results not disclosed or suggested in the disclosure of the JP '793 application.

Specifically, Example 3 of the originally filed specification shows that  $\beta$ -1,4-mannobiose of the present invention, when mixed with a solution of salmonella and yeast, is capable of salmonella-recognition, although not to the same extent as mannose. Example 4 of the present specification shows that the  $\beta$ -1,4-mannobiose-containing composition as instantly claimed has a lower metabolic rate compared to a mannose-containing composition. Results discussed in Examples 3 and 4 suggest that the instantly claimed  $\beta$ -1,4-mannobiose-containing composition functions more effectively than mannose in terms of the inhibition of salmonella colonization. Because  $\beta$ -1,4-mannobiose is not as easily digested by intestinal bacteria of livestock, salmonella can be discharged from the body efficiently.

Furthermore, Examples 5, 7, and 8 describe a comparison of feeds including: an additive-free feed, a mannose-type feed, and a  $\beta$ -1,4-mannobiose-type feed. Example 5 is directed to testing commercial layer chicks with a  $\beta$ -1,4-mannobiose-type feed prepared using the  $\beta$ -1,4-mannobiose composition according to Example 2, which uses a Hemicellulase GM "AMANO" enzyme. Examples 7 and 8 are directed to testing commercial layer and broiler chicks, respectively, with a  $\beta$ -1,4-mannobiose-type feed prepared using the  $\beta$ -1,4-mannobiose composition according to Example 6, which uses a Sumizyme ACH enzyme. The blended feed

compositions are within the claimed range of 0.001-1% by weight of the dry matter portion of the feed. Since the dry powder produced by Example 2 is 12.9%  $\beta$ -1,4-mannobiose, i.e., 12.35 parts  $\beta$ -1,4-mannobiose to 106 total parts, or  $12.35/106 = 12.9\%$  (*see*: pg. 13, lines 12-15), and the blended feed is 0.1% by weight of the 12.9%  $\beta$ -1,4-mannobiose dry powder, the resulting blended feed of Example 5 is 0.0129% by weight of  $\beta$ -1,4-mannobiose, i.e.,  $12.9\% \times 0.1\% = 0.0129\%$ . For examples 7 and 8, since the dry powder produced by Example 6 is 13.8%  $\beta$ -1,4-mannobiose, i.e., 14.18 parts  $\beta$ -1,4-mannobiose to 103 total parts, or  $14.18/103 = 13.8\%$  (*see*: pg. 18, lines 19-21), and the blended feed is 0.1% by weight of the 13.8%  $\beta$ -1,4-mannobiose dry powder, the resulting blended feeds of Examples 7 and 8 are 0.0138% by weight of  $\beta$ -1,4-mannobiose, i.e.,  $13.8\% \times 0.1\% = 0.0138\%$ .

The different feeds were fed to newly hatched male chicks of commercial layers and broiler and the results show that feed blended with the  $\beta$ -1,4-mannobiose-containing composition as claimed consistently decreases the number of salmonella colonies in the cecal content after feeding chicks of commercial broilers and layers. Also refer to Tables 3, 4, and 5 and Figures 1, 2, and 3 for support. The experimental data disclosed in the instant specification demonstrate a property not taught by the JP '793 application, as well as unexpected and improved results.

Therefore, applicants assert that the JP '793 application does not anticipate nor render obvious the claimed invention. Since there is no disclosure or suggestion to modify the JP '793 method of producing mannobiose to arrive at the claimed methods using  $\beta$ -1,4-mannobiose compositions as feed additives, which inhibit the colonization of salmonella (claims 10-12 and 15) and for methods of inhibiting the colonization of salmonella of the instant

invention (claims 16-19), applicants assert that the methods and compositions claimed in the instant application are patentably distinct over those of the JP '793 application. Reconsideration and withdrawal of the §102(b) rejection to pending claims 10-12 and 15-19 are respectfully requested.

#### Dependent Claims

The applicants have not independently addressed all of the rejections of the dependent claims. The applicants submit that for at least similar reasons as to why independent claims 10, 11, 16, and 17 from which all of the dependent claims 12 and 18-19 depend are believed allowable as discussed *supra*, the dependent claims are also allowable. The applicants however, reserve the right to address any individual rejections of the dependent claims and present independent bases for allowance for the dependent claims should such be necessary or appropriate.

#### CONCLUSION

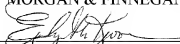
Based on the foregoing amendments and remarks, Applicants respectfully request allowance of this application.

**AUTHORIZATION**

The Commissioner is hereby authorized to charge any additional fees which may be required for consideration of this Amendment to Deposit Account No. **13-4500**, Order No. 4439-4033.

In the event that an extension of time is required, or which may be required in addition to that requested in a petition for an extension of time, the Commissioner is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. **13-4500**, Order No. 4439-4033.

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